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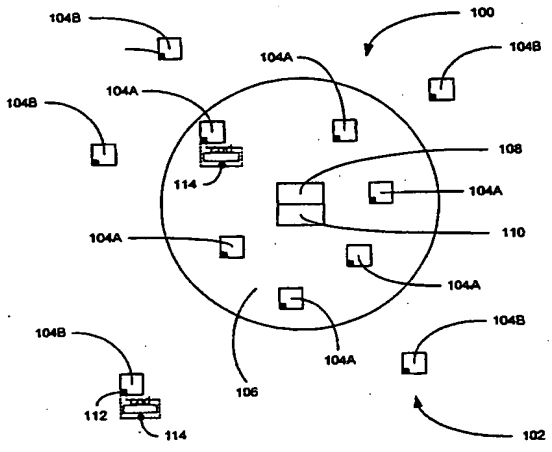

(57) Abstract: An inventory control system is described which includes anti-collision, radio frequency indentification apparatus or tags affixed to each item of an inventory and including a unique modulation code, an interrogator/reader that generates a field of sufficient range to activate each tag associated with each item of the inventory in communication with a computer. The computer includes a list comprising an identifier for each item in the inventory, the modulation code for the tag associated with each item in the inventory and an item status where the status indicates whether the item is present or absent.

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TITLE: INVENTORY CONTROL SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an inventory control system where each item of the inventory is tagged with an anti-collision, radio frequency identification apparatus, and the tags are interrogated and read by an interrogator/reader.

More particularly, the present invention relates to an inventory control system where an interrogator/reader supplies energy to an anti-collision, radio frequency identification apparatus or tag affixed to each item of the inventory and having a unique programmable identifier and a digital processing unit which stores data sufficient to associate a given tag identifier with a particular item of inventory and is capable of identifying inventory items outside of the range of the field generated by the interrogator/reader.

2. Description of the Related Art

Various inventory control systems have been described and implemented in the market place such as systems for keeping track of items used in games or sports such as golf, skiing or the like or for keeping track of children or any other item or animal in a given situation. Such systems are described in various United States patents including: 5,870,023; 5,844,483; 5,841;352; 5,757,271; 5,689,240; 5,661,460; 5,646,593; 5,565,845; 5,557,259; 5,525,967; 5,493,274; 5,289,163; 5,028,909; 5,001,461; 4,973,944; 4,922,229; 4,899,135; 4,489,314; 4,535,322; and 4,042,918, incorporated herein by reference.

Although such systems provide some tracking and protection against loss of an item, such systems do not provide efficient multi-item tracking, loss or misplacement protection. Thus, there is a need in the art for a system which can identify and keep

track of multiple items and alert a user when items are lost or misplaced.

SUMMARY OF THE INVENTION

The present invention provides an inventory control system for tagging, identifying and tracking items of an inventory so that accurate inventory accounting can be performed, especially after activities involving use of items of the inventory. The system includes a digital processing unit (DPU). The DPU includes at least a processing unit, a memory, an operating system, communication hardware and software, and a peripheral for interaction with a user. The DPU also includes a list or table having an entry for each item in the inventory and comprises at least a unique item identifier (name), a unique item modulation code, and an item status indicator. The system also includes a radio frequency, identification (RFID) apparatus removably or permanently affixed to each item in the inventory and encoded with that item's unique modulation code. The system further includes an interrogator/reader in communication with the DPU that causes any RFID apparatus within a range of the interrogator/reader to transmit a signal modulated by its unique code. The interrogator/reader receives the signal and forwards the code to the DPU which updates the file so that the status indicator, flag or field of the item associated with the transmitting RFID apparatus is set to a "present" condition (*i.e.*, the item is within the range of interrogator/reader); otherwise the status indicator is set to an "absent" condition (*i.e.*, the item is outside of the range of the interrogator/reader). Optionally, the operating system includes a user interface so that the user can interact with the DPU via the peripheral. The user interaction would include at least requesting a current inventory status check or the like.

The present invention also provides a method for tagging, identifying, tracking and notifying a user when an item in an inventory is not returned to its pre-use place or designated location after completion of a given activity involving at least one item in the inventory. The method includes tagging each item of the inventory with a radio frequency, identification (RFID) apparatus encoded with an item specific code and

storing the code in an item indexed list in a digital processing unit (DPU) where the list includes a unique item identifier, the item specific code and an item status flag. Once tagged, an interrogator/reader causes each item RFID to emit a periodic signal whenever the RFID is within a range of a radio frequency (RF) field generated by the interrogator/reader. A received signal causes the interrogator/reader to send the code embedded in the signal to the DPU which sets the item status indicator flag to a condition indicating the item is within the field, *e.g.,* to a present condition. When an item is positioned outside of the range of the RF field generated by the interrogator/reader, then the RFID stops transmitting its signal, the interrogator/reader stops receiving the signal and stops sending the code to the DPU. The DPU, then, sets the item status indicator flag to a condition indicating that the item is outside the field, *e.g.*, an absent condition. When the item is returned to a position within the range of the interrogator/reader, the RFID is activated and begins emitting its signal again, which is received by the interrogator/reader. The interrogator/reader then sends the code to the DPU which in turn sets the item status indicator flag back to a present condition. Upon completion of the activity or task, the DPU can be polled by a user to determine whether any items are missing and the identity of any missing items. The missing items can then be sought, marked missing or deleted from the list. Alternatively, the DPU can alert the user of a missing item condition by beeping, flashing or some other suitable signal.

DESCRIPTION OF THE DRAWINGS

The invention can be better understood with reference to the following detailed description together with the appended illustrative drawings in which like elements are numbered the same:

Figure 1A depicts a preferred embodiment of an inventory control system of the present invention;

Figure 1B depicts a preferred configuration of a digital processing unit used in the inventory control systems of the present invention;

Figure 2 is an alternative preferred embodiment of a golf bag inventory system of the present invention;

Figure 3 is an alternative preferred embodiment of the present system located in an hospital operating room;

Figure 4 is an alternative preferred embodiment of the present system is located in a pasture; and

Figure 5 is an alternative preferred embodiment of the present system located in a children's play area.

DETAILED DESCRIPTION OF THE INVENTION

The inventor has found that an efficient and effective system for keeping track of items in an inventory can be designed by affixing to each item in the inventory an anti-collision, radio frequency, identification (ACRFID) apparatus so that a digital processing unit (DPU) can determine when an item is inside or outside a range of a field generated by an interrogator/reader apparatus. The inventory can comprise a plurality of items such as books, children, livestock, toys, equipment, sports equipment such as golf equipment, soccer equipment, baseball equipment, fishing equipment, *etc.*, parts of an apparatus or an article, medical equipment used in operating rooms, items used to repair an apparatus or an article, files, or any other item in a given locale or location.

Broadly, the system of the present invention includes a plurality of radio frequency identification (RFID) apparatus, and preferably, RFID with anti-collision capabilities removably or permanently affixed to each item or animal of an inventory, where each apparatus is capable of being encoded with a unique identification code. The system also includes an interrogator/reader designed to generate an RF field capable of activating the RFID's. Each RFID within range of the RF field emits a signal modulated by its unique code. The system further includes a DPU in communication with the interrogator/reader. The DPU is designed to receive unique codes and modify an item status field of a list including at least a unique item

identifier, its associated unique code of the RFID affixed to the item, and an item status indicator, *e.g.*, a flag or field. When an item of the inventory is within the range of the field generated by the interrogator/reader, then the item's RFID transmits a signal modulated by the code. The interrogator/reader receives the signal, retrieves the code and sends it to the DPU. The DPU then sets the item's status flag to a "present" or "TRUE" condition. If an item is moved of a location outside of the range of the interrogator/reader, then the DPU will set the item's status flag to an "absent" or "FALSE" condition due either to a loss of signal or due to a timeout event.

The method of present invention implemented on a DPU includes affixing to each item or animal of an inventory an RFID encoded with a unique code, storing on the DPU in a list including at least a unique item or animal descriptor or identifier, the unique code associated with its affixed RFID and a status flag indicating whether the item or animal is inside or outside a range of an interrogator/reader associated with the DPU. When an item is moved to a location outside the range of the interrogator/reader, the DPU will change the item's status from a "present" or "TRUE" condition to an "absent" or "FALSE" condition. The DPU can then be polled at any time to determine the status of all tagged items or animals within the inventory or plurality. Alternatively, the DPU can change to an "alert" condition if any item in the inventory is outside the interrogator/reader range and provide a corresponding "alert" indication.

One preferred system of the present invention is a golf equipment tracking system, where a golf bag includes a DPU, an interrogator/reader, and a plurality of golf items such as clubs, gloves, or the like having affixed or attached an ACRFID encoded with a unique code. Thus, when a club is removed from the bag, the club will stop transmitting a signal to the interrogator/reader associated with the DPU. When the signal stops, the DPU will update a status of the club to evidence that the club has been removed. If the club is returned, then the field generated by the interrogator will cause the tag to resume emitting a signal containing its unique code, the interrogator will receive the signal and the DPU will update the status of the club to indicate that the

missing club has been return to the bag. At any time, the golfer can request the DPU to identify any golf equipment that does not have its status in a "present" condition, *i.e.*, identify the equipment that has not been returned.

Alternatively, the software implemented in the DPU can indicate an "alert" condition if a club is removed from the bag and is not returned after some specified period of time. Thus, the DPU software can include routines that time/date stamp a field associated with items in the inventory when an item is moved to a location outside of the activating field generated by the interrogator and the item's tag stops transmitting its signal. The routines will then check the time/date stamp for a time off condition evidencing that the item has not been returned within a specified period of time. Alternatively, the software can include timer routines that start a timer when communication with a tag ceases because the item is now located outside of the activating field. The timer will be set to some specified period and a time out will indicate that the item has not been returned. In either event, a time out will cause the software to place the system in an "alert" condition. Once the item is returned and its tag is in communication with the interrogator/reader, then the time keeping routines will discontinue time monitoring or disable the timer, set its status field to a "present" condition and disable the "alert" condition.

Another preferred embodiment of the present invention is a medical equipment tracking system for use in operating rooms. This system includes a DPU, an interrogator/reader in communication with the DPU, and a plurality of medical equipment such as scalpels, other instruments, sponges, or the like, each having affixed or attached an ACRFID tag encoded with a unique code. When the tagged items are within an activation zone generated by the interrogator/reader, the tags will transmit a signal modulated by its unique code and the DPU will set the item's status to a condition evidencing its presence within that zone. When an item such as a sponge is removed from the zone, then the item's tag will stop transmitting its signal causing the DPU to update its status indicating that the items has been moved to a location outside of the zone. If the item is returned to a location within the zone, then the interrogator

will cause its tag to resume transmitting its signal containing its unique code and the DPU will update its status indicating that the item is within the zone. At any time, a medical service provider can request the DPU to identify any equipment that does not have its status in a present condition, *i.e.*, identify the items that have not been returned to a location within the zone.

Suitable ACRFID tags include, without limitation, tags manufactured by Microchip Technology Inc. (www.microchip.com) including MCRF355 tags or the like as well as any other field activated apparatus that will transmit a signal modulated with a unique modulation code. The interrogator and tag can be used to provide inventory control systems within the scope of the present invention that are capable of activating a large number of tags within a given space. The antenna array on the tag and the strength of the field generated by the interrogator can be adjusted by those skilled in the art to increase or decrease a zone within which a "TRUE" or "present" condition will be indicated. For example, a larger antenna size and a stronger field will increase the size of the zone within which the tags will be activated by the field. Correspondingly, a smaller antenna size and weaker field strength will reduce the size of the zone within which the tags will be activated by the field.

By controlling the antenna size associated with the tags and the interrogator field strength, the size of the zone within which the tags will be activated can be controlled to a desired degree of accuracy and precision. The specified tags have an upper limit of several tens of feet. Anti-collision is generally performed by software and hardware of the tag which delays signal transmission whenever the hardware and software of the tag senses transmission by another tag. Thus, the tags preferably send only periodic signals to the interrogator/reader in such a manner that the reader only receive a signal transmission during a specified period of time. Thus, these tags generally transmit only a periodic signal. Because these tags generally transmit only periodically, the tracking software will be designed to expect a signal from a tag at some set interval. If a tag fails to transmit a signal within the interval, then the software can immediately set an alert or alarm condition (beep, flash, buzz, hum or the

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like), can wait a given length of time before going into an alarm condition or simply note the lack to transmission and await user polling. For child care inventory system, immediate alert or alarm setting will be preferred. Immediate alarms will also generally be preferred for store setting or other setting where immediate response to removed items is required.

Tags designed to function in an anti-collision manner have programmable memory on tag. The programmable memory includes at least an address for a unique code that will be used to modulate the signal transmitted by the tag. The signal is generally in the tens of megahertz range and preferably in the 10 to 15 MHz range and especially in the 12 to 14 MHz range and most preferred between about 13 and about 14 MHz. The size of the address for the code will determine the number of tags that can be polled simultaneously by a single interrogator. The tags from Microchip have a 15 bit code address memory allowing 2^{15} (40,728) tags to be simultaneously polled. Generally, the address is at least 7 bits in length, and preferably at least 15 bits in length. Of course, tags with smaller or larger memory addresses will allow smaller and larger inventories to be polled.

Suitable DPUs include, without limitation, a computer containing a processing unit, a memory, at least one communication protocol supported by associated hardware and software, at least one peripheral, an operating system and a filed creation, editing and management system such as a database program, a word processing program, a spreadsheet program or the like.

Referring now to Figure 1A, a preferred embodiment of an inventory control system of the present invention **100** generally includes an inventory **102** of items **104A** located inside and items **104B** located outside of an activation zone or field **106** generated by an interrogator/reader **108** in communication with a DPU **110**. Each item **104** is tagged with a field activated tag **112** having a unique modulation code **114**.

A preferred DPU **110** for use in the present invention is depicted generally in Figure 1B. The DPU **110** includes a processing unit **116**, a memory **118**, communication hardware **120**, and a peripheral **122** for interfacing with a user. The

DPU **110** further includes an operating system **124**, preferably a windowing operating system, a user interface **126**, preferably a graphics user interface (GUI) and communication software **128**. The DPU **110** further includes word or list handling software **130** and a list **132** comprising an identifier **134** for each item **104** of the inventory **102**, the unique code **114** of its associated tag **112** and a status field **136** which indicates whether a particular inventory item **104** is inside or outside of the field **106** generated by the interrogator/reader **108**.

For the items **104A** inside the field **106**, their status field **134** will indicate that the item is present. If the status field **136** is simply a true/false flag, then a TRUE condition of the status field **136** can indicate inside or outside the field **106**, while a FALSE condition can represent the opposite. Thus, the status field **136** associated with each item **104A** would be in a TRUE condition, while the status field **136** associated withe each item **104B** would be in a FALSE condition. At any time, the user can enter a command through the peripheral **122** using the user interface **126** in conjunction with the operating system **124** to determine the status of each item in the inventory.

If all of the items **104** originally start out within the field **106**, then their status fields **136** will all be in a TRUE condition. After a given activity involving the items **104**, some items **104B** may not be returned to a location within the field **106** and the status field **136** for those items would be in a FALSE condition. If the inventory is then polled either by the user or the DPU **110**, then the user or the DPU **110** can determine which items have a FALSE condition, and, are, therefore, not within the field **106** generated by the interrogator/reader **108**.

Additionally, the DPU **110** can sound an alarm if any item in the inventory is not returned to a location within the field **106** after a given time after its removal or after the commencement of a given task or activity. If the inventory includes items used in a medical procedure, then the DPU **110** can be polled after the completion of surgery or after the estimated time the surgery should take, and missing items of inventory can be located and returned to their appropriate place.

Moreover, the DPU **110** can include additional hardware and software to set and

stop timers or elapsed time indicators automatically based on activity levels in a surrounding or start/stop activities of certain apparatus used in a given task or activity.

Referring now to Figure 2, a preferred embodiment of a golf bag inventory system **200** generally includes a bag **202** having associated therewith a DPU **204**, an interrogator/reader **206** in communication with the DPU **204**, and a power source or supply **208** for supplying electrical power to the DPU **204** and the interrogator **206**. Preferably, the interrogator/reader **206** has a field range sufficient to activate tags on items located inside the golf bag **202**, but not tags on items located outside the bag **202**. The power supply **208** is generally a battery, with lithium batteries being preferred. As in the system of Figure 1B, the DPU **204** generally includes at least a processor, a memory, a peripheral, communication hardware, an operating system, a file processing routine(s), and communication software. The bag **202** also includes a plurality of clubs **210**; each club **210** having affixed thereto an ACRFID tag **212** encoded with a unique transmission modulation code, where each tag **212** generates a signal modulated by its unique code when the tag **212** is within the range of the field generated by the interrogator/reader **206**.

The DPU **204**, the interrogator **206** and the power supply **208** are preferably housed in a housing **214** which can be a small shock resistant box, card or other similar housing removably attached, for example, to a carrying strap **216** of the bag **202** by an attachment strap **217**. Preferably, each tag **212** is positioned on each club **210** so that the each tag **212** will be located in an interior portion **218** of the bag **202** when the clubs **210** are place properly within the bag **202**. One particularly preferred the tag placement is to position each tag **212** at or near a grip **220** of each club **210**. However, the tags can be affixed to any portion of the club. The inventor has also found that with items that have substantial metal components, the metal to the item can be used to increase antenna dimension without increasing the actual size of the antenna associated with the tag itself.

Preferably, the interrogator/reader **206** generates a field **222** sufficient to activate all tags on all items in the golf bag **202** or very near the bag. Because the

control system associated with a golf bag is designed to notify golfers when equipment such as clubs are not placed back into the bag after use, the field **222** associated with the interrogator **206** is preferably of a relatively limited range. Generally, the field **222** should be able to activate tags **212** within about a volume have a radius of about 2 feet or less centered about the interrogator **206** and preferably a radius of about 1.5 feet or less and especially a radius of about 1 foot or less. Again, the field strength needed to activate tags in a given volume will depend on the power of the RF field generated by the interrogator and the size of the receiving antenna associated with the tag. As the RF power increases the size of the antenna associated with the tags can decrease and vis-a-versa.

Alternatively, the DPU, the interrogator, and the power supply can be housed in a compartment within the bag. It should also be recognized that the DPU, interrogator and power supply can be a single or multi-piece device and can be relatively small in size. The DPU is generally includes a relatively modest processor and memory; virtually any digital processing unit can be used.

Referring now to Figure 3, another preferred embodiment of the present system is shown located in an operating room **300** which includes an equipment table **302** and an operating table **304**. Associated with the equipment table **302** is a DPU **306**, an interrogator/reader **308** in communication with the DPU **306**, and a power source or supply **310** for supplying electrical power to the DPU **306** and the interrogator **308**. The power source **310** is generally either an AC outlet or a battery, with an AC outlet being preferred. As shown in Figure 1B, the DPU **306** generally will include at least a processor, a memory, a peripheral, communication hardware, an operating system, a word or list processing routine or routines and communication software (not shown). Preferably, the interrogator/reader **308** will have a field range sufficient to activate all tagged items on the equipment table **302**, but insufficient to activate items activated items not on the equipment table **302**. The size of the field needed will be related to the size of the table for which the inventory control system is designed. Preferably, the field should have a range somewhat smaller than the size of the equipment table **302**

to ensure that equipment is returned to a position within the field associated with the equipment table **302** after an operation.

The equipment table **302** generally includes a plurality of medical items **312** used in operations such as sponges **314**, scalpels **316**, retractors **318** or the like. Each item **312** has affixed thereto an ACRFID tag **320** encoded with a unique transmission modulation code, whereby each tag **320** generates a signal modulated by its unique code when the tag **320** is within the range of the interrogator/reader **308**.

Referring now to Figure 4, another preferred embodiment of the present system is shown conjunction with an animal containment area such as in a pasture **400** including a DPU **402**, interrogator/reader **404** in communication with the DPU **402**, and a power source **406** for supplying electrical power to the DPU **402** and the interrogator **404**, all generally located in a vehicle **408**. The power source **406** may be a battery associated with the starting system of the vehicle **408**; however, the power source can be a separate generator, or a separate battery with lithium batteries being preferred. As in Figure 1B, the DPU generally includes at least a processor, a memory, a peripheral, communication hardware an operating system, file processing routine and communication software.

The pasture **400** also includes a plurality of livestock **410**, each animal **410** having affixed thereto a RFID tag **412** encoded with a unique transmission modulation code, whereby each tag **412** generates a signal containing its unique code when the tag **412** is within the range of the interrogator/reader **404**. The interrogator/reader **404** generates a field having range sufficient to activate the tags **412** affixed to animals **410** when the vehicle **408** is within a predetermined distance from the animal, with a range of about 5 feet being preferred and a range of about 10 foot being particularly preferred.

Of course, the DPU, interrogator and power source can also be positioned on alternative transport means, for example, a horse or a helicopter. The computer software in this preferred embodiment would be programmed differently and would not be designed to indicate that all animals were in the pasture. Thus, the software

could be programmed so that, initially, all the status fields associated with the animals would be in a FALSE condition. The vehicle would then travel through the pasture as the vehicle passed near an animal, its tag would be activated, and the software would change the status to TRUE. The DPU could also include data on each animal to aid the driver in locating and identifying animals.

Alternatively, the DPU, interrogator and power source can be associated with a gate, entrance or exit to a pasture or corral. In such an embodiment, the computer software would change the status of an animal to a present or TRUE condition when the animal passed through the gate, entrance or exit.

Referring to Figure 5, yet another preferred embodiment of the present system is shown located at each entrance or exit **500** to a children's play area **502** which includes a DPU **504**, an interrogator/reader **506** in communication with the DPU **504**, and a power source **508** for supplying electrical power to the DPU **504** and the interrogator **506**. The power source **508** is preferably either a power supply plugged into an AC plug or a battery, with lithium batteries being preferred. As in shown in Figure 1B, the DPU includes at least a processor, a memory, a peripheral, communication hardware an operating system, file processing routine and communication software. The area **502** will periodically include a plurality of children **510**; each child **510** wearing an RFID tag **512** encoded with a unique transmission modulation code, whereby each tag **512** generates a signal containing its unique code when the tag **512** is within the range of the interrogator/reader **506**. The interrogator/reader **506** has a field range sufficient to activate a tag **512** passing through the entrance or exit **500**. In this embodiment, the software is designed to trigger an alarm whenever a child **510** passes within range of the field generated by the interrogator **506**. The alarm may serve to notify attendants that a child is attempting to leave the area without having its tag removed.

Although the invention has been disclosed with reference to its alternative preferred embodiments, from reading this description, those of skill in the art may appreciate changes and modification that may be made which do not depart from the

scope and spirit of the invention as described above and claimed hereafter.

CLAIMS

We claim:

1. An inventory control apparatus comprising:

a computer including:

a list implemented therein comprising:

a unique item identifier for each item in an inventory;

a unique item code; and

an item status;

an anti-collision, field activated apparatus affixed to each item in the inventory; and

an interrogator/reader in communication with the computer which generates a field capable of causing each field activated apparatus to transmit a signal containing its unique code; and

where the status of each item activated by the interrogator/reader is set to a first state indicating that the item is present, while the status of all other items is set to a second state indicating that the item is absent.

2. The apparatus of claim 1, wherein the digital processing unit further comprises:

a processing unit for executing instructions;

a memory in electrical communication the processing unit;

a peripheral for interfacing with a user;

communication hardware and software for wireless and non-wireless communication;

an operating system; and

a list processing software.

3. The apparatus of claim 1, wherein the field is an RF field.

4. The apparatus of claim 1, wherein the code is at least 7 bits in length.

5. The apparatus of claim 1, wherein the code is at least 15 bits in length and the field activated apparatus transmits a signal between about 10 and 15 MHz.

6. The apparatus of claim 5, wherein the items are golf clubs and the control apparatus is associated with a golf bag.

7. The apparatus of claim 5, wherein the items are medical equipment used in medical procedures and the control apparatus is associated with an equipment table in an operating room.

8. The apparatus of claim 5, wherein the items are children and the control apparatus is associated with a playground or play area.

9. The apparatus of claim 5, wherein the items are animals and the control apparatus is associated with a pasture or corral.

10. A golf club bag inventory apparatus comprising:
a golf club bag;
a housing removably attached to the bag including:
a digital processing unit having:
a list implemented therein comprising:

a unique item identifier for each item in an inventory;

a unique item code; and

an item status;

an interrogator/reader apparatus in communication with the computer which generates a field surrounding the generator/receiver; and

a power source for supply electrical power to the digital processing unit and the interrogator;

a plurality of field activated apparatus affixed to each item to be place within the bag, each apparatus having a unique code that modulates a signal transmitted by the apparatus when activated by the field generated by the interrogator; and

where each item within range of the field generated by the interrogator/reader has an item status indicating that the item is in its first state and where each item outside the range of the field generated by the interrogator/reader has an item status indicating that the item is in an absent state.

11. The bag of claim 10, wherein the digital processing unit further comprises:

a processing unit for executing instructions;

a memory in electrical communication the processing unit;

a peripheral for interfacing with a user;

communication hardware and software for wireless and non-wireless communication;

an operating system; and

a list processing software.

12. The bag of claim 10, wherein the field is an RF field.

13. The bag of claim 10, wherein the code is at least 7 bits in length.

14. The bag of claim 10, wherein the code is at least 15 bits in length and the field activated apparatus transmits a signal between about 10 and 15 MHz.

15. A method for inventory control comprising the steps of:
affixing to each item in an inventory a field activated apparatus including a unique modulation code;
polling each field activated apparatus via a field generated by an interrogator/reader and having a range sufficient to activate each field activated apparatus affixed to each item of the inventory;
setting an item status to a present state in a list implemented on a digital processing unit associated with the interrogator, where the list includes at least an unique item identifier for each item in the inventory, the unique modulation code for the field activated apparatus affixed to each item, and the item status; and
changing the item status to an absent state for each item removed from the range of the field of the interrogator/reader.

16. The method of claim 15, further comprising the step of:
outputting the list indicating which items of the inventory are in a present state and which are in an absent state.

17. The method of claim 16, wherein the digital processing unit further comprises:

a processing unit for executing instructions;

a memory in electrical communication the processing unit;

a peripheral for interfacing with a user;

communication hardware and software for wireless and non-wireless communication;

an operating system; and

a list processing software.

18. The method of claim 15, wherein the field is an RF field.

19. The method of claim 15, wherein the code is at least 7 bits in length.

20. The method of claim 15, wherein the code is at least 15 bits in length and the field activated apparatus transmits a signal between about 10 and 15 MHz.

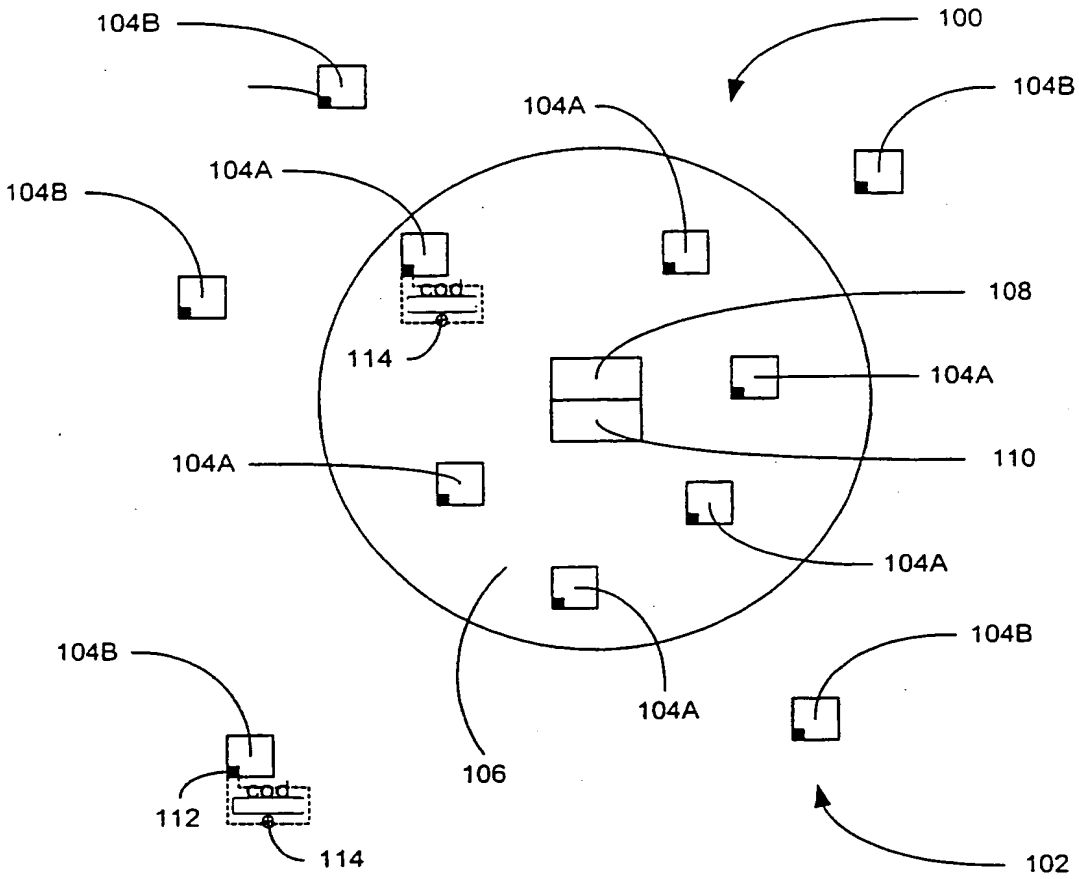

FIG. 1A

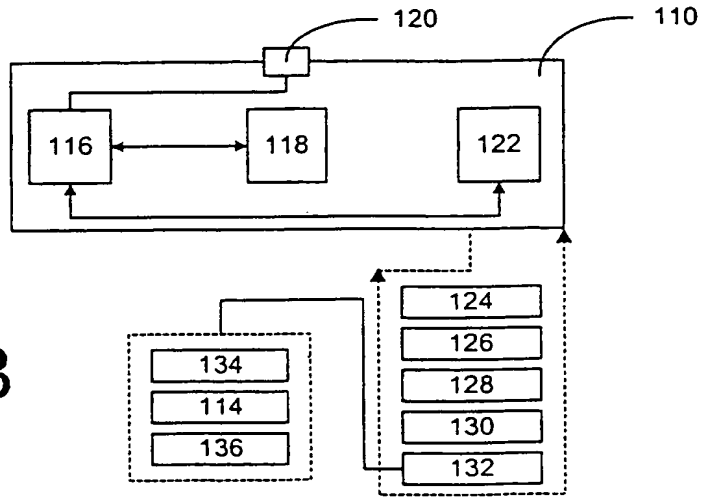

FIG. 1B

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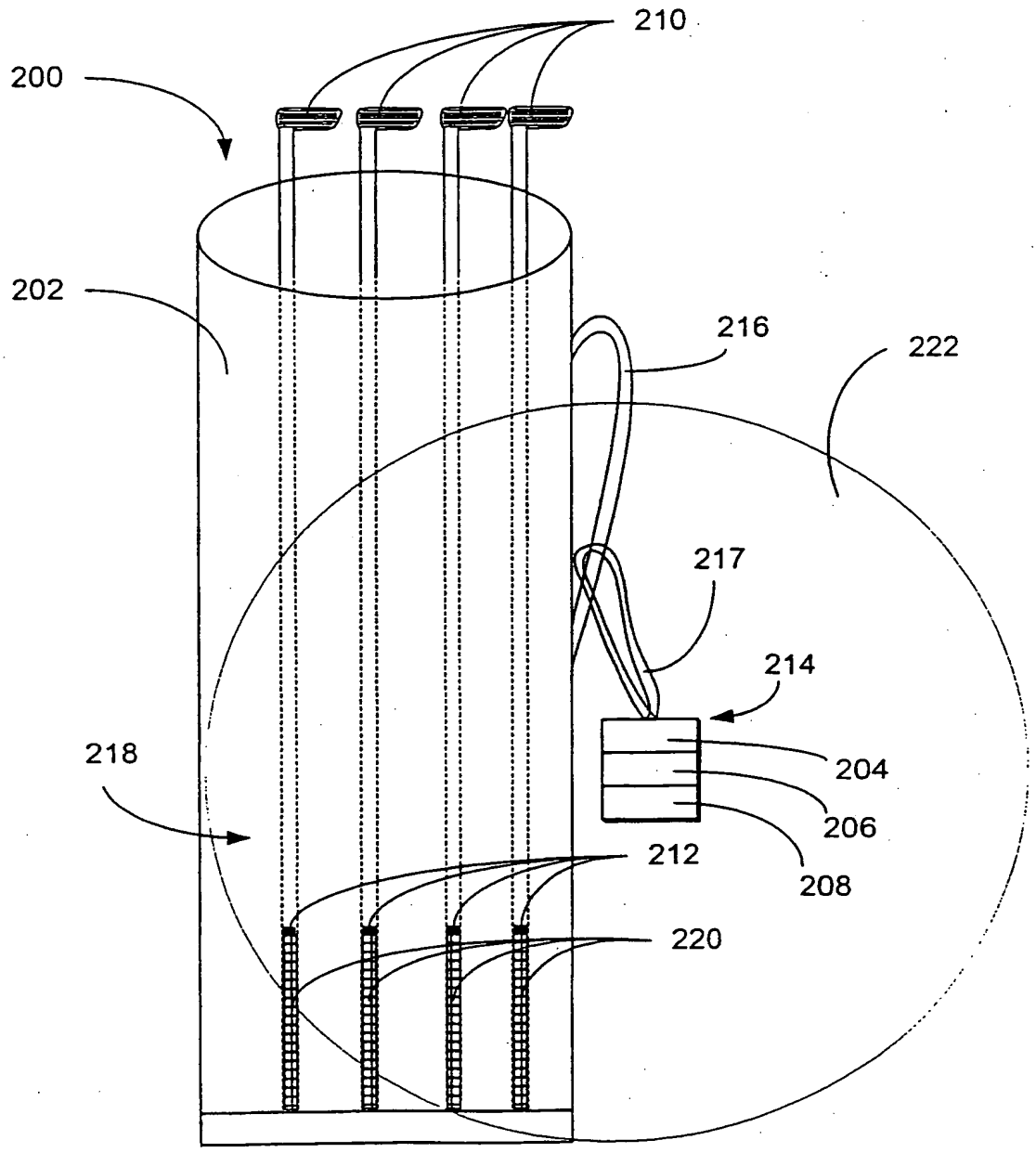

FIG. 2

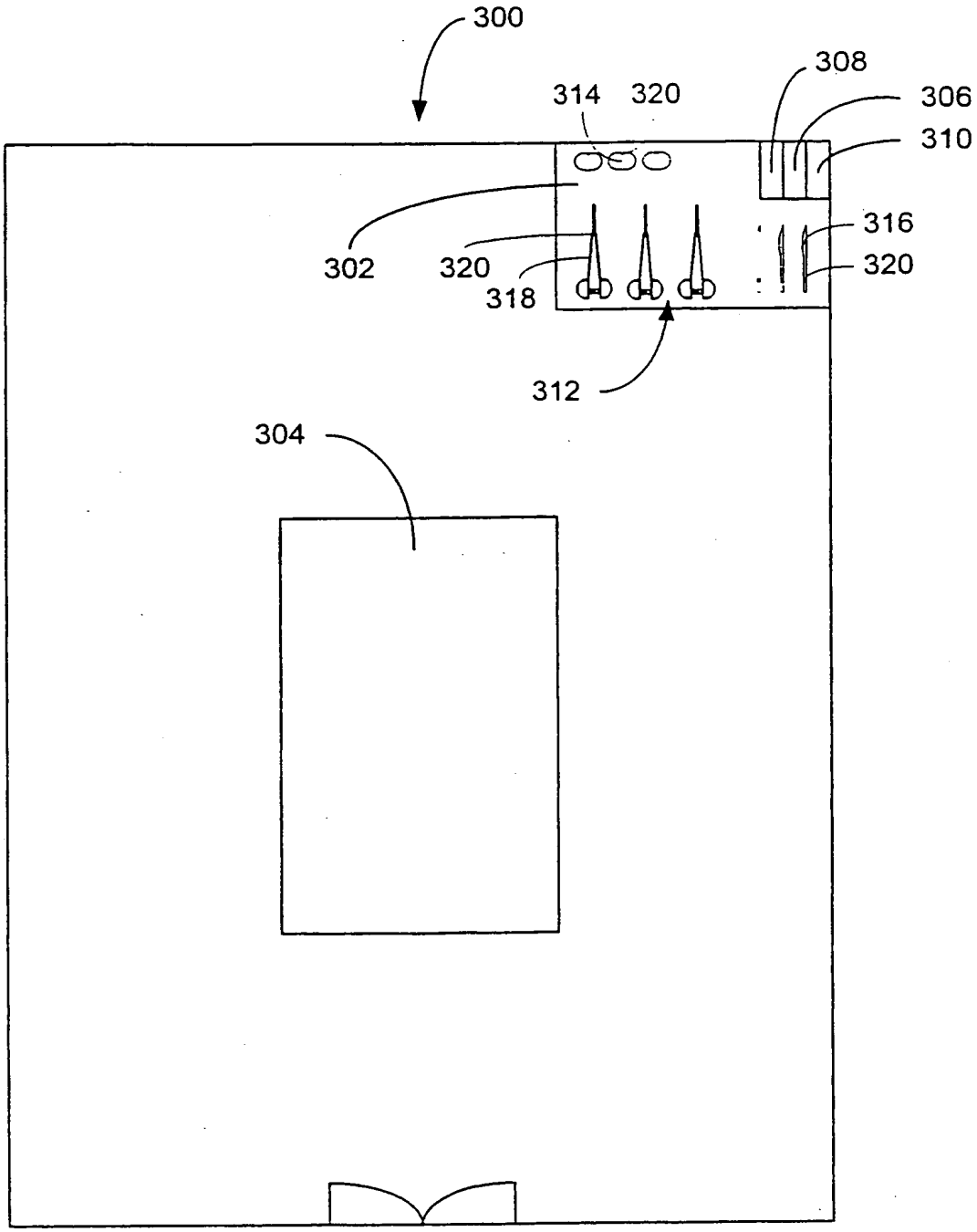

FIG. 3

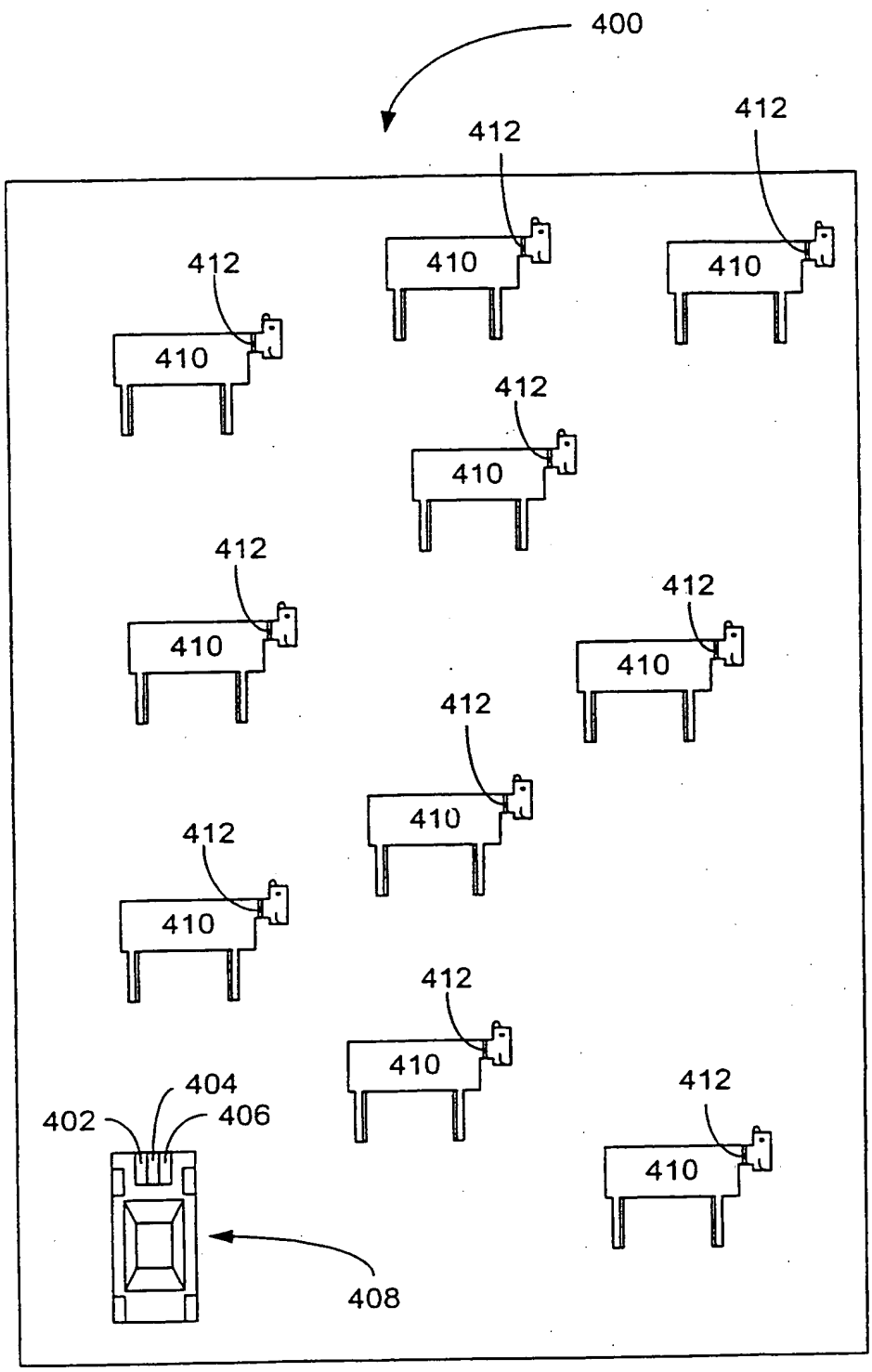

FIG. 4

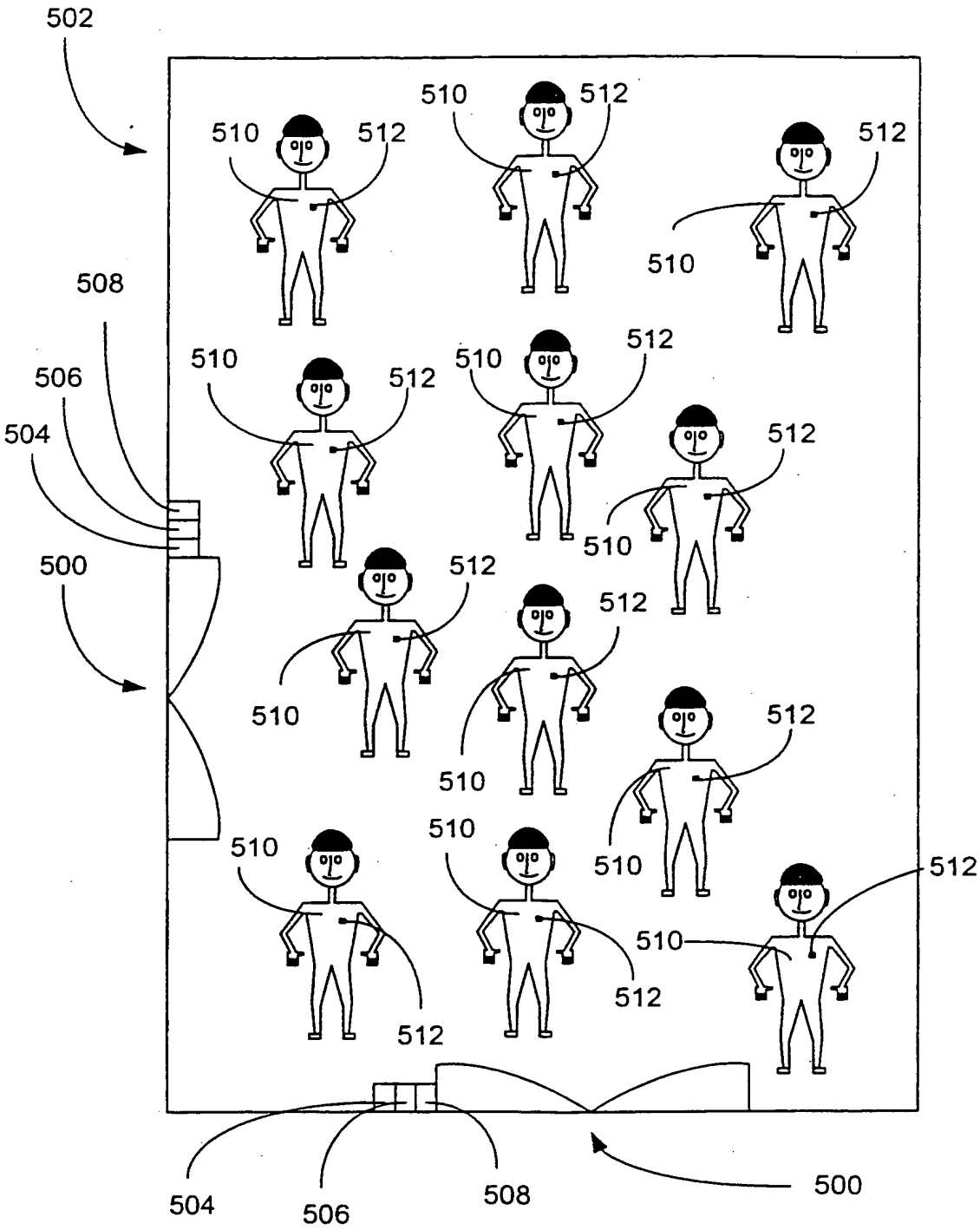

FIG. 5